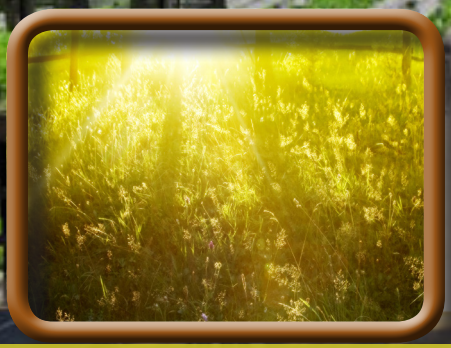
Volume 3, Issue 2, 2014

October 2014

ISSN: 2319-880X

International Journal Of Agricultural Science & Technology



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IJAST

International Journal
Of
Agricultural Science & Technology

Volume 3, Issue 2

October 2014

Cite this volume as 3(2)IJAST(2014) and so on....

" This journal is Indexed/abstracted in Indian Science Abstract "

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Volume 3, 2014 | October 2014 | Issue 2, 2014

Editorial Board

ISSN : 2319-880X

International Journal Of Agricultural Science & Technology

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International Journal
Of
Agricultural Science & Technology

Volume No. 3 October 2014 Issue No. 2, 2014

Contents

Int. J. Agri.Sci. & Tech. Vol. 3 (2) 2014, pp. 1-10

ISSN: 2319-880X

ALLELOPATHIC EFFECT OF *Eucalyptus tereticornis* CLONE 3 ON GERMINATION AND GROWTH OF *Vigna mungo L*

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(Date of Receipt :24-08-2014 ; Date of Acceptance for Publication : 01-09-2014)

Abstract

The study was conducted to determine the allelopathic effect of *Eucalyptus tereticornis* clone 3 on urd (*Vigna mungo* L. Hepper) crop. Leaf extracts of *Eucalyptus tereticornis* clone 3 were used to run the experiment under laboratory condition. The aqueous extracts of leaf showed significant inhibitory effect on germination, root and shoot elongation of urd plants. The inhibitory effect was proportional to the concentrations of the extracts and the higher concentration (15%) had the strongest inhibitory effect. In plant part Leaf extract was more inhibitory effect compared to twig and root extract. From the obtained results, it can be concluded that, eucalyptus seem to be a potential threat to the pulses industry under small-scale farming condition. Therefore, it could be recommend that different remedial practices (like removal of excess leaf litters, planting after the rains) should be done before sowing pulses, in land previously planted with Eucalyptus in order to reduce the potential risks.

Key words: Allelopathy, Clone , *Eucalyptus tereticornis*, Germination and *Vigna mungo*.

Pages :10 **References: 29**

INTRODUCTION

Agroforestry is a dynamic, ecologically based natural resources management system that, through integration of trees on farms and agricultural landscapes, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels.

Eucalyptus spp. is indigenous to Australia and has been introduced into many countries, owing to their fast growth and their rising demand for paper and plywood (Cossalter and Pye-Smith 2003, Turnbull 1999). To fill the widening gap between the supply and demand of forest raw materials, many *Eucalyptus* species are even grown in agricultural fields with crops (Lisanework and Michelsem 1993, Malik 2004) owing to its fast growth (Cossalter and Pye-Smith 2003) wider adaptability (Gandner 2007,

ISSN: 2319-880X

Johansson and Tuomela 1996) and high productivity (Singh and Toky 1995). The genus *Eucalyptus* predominates tree-planting practices among smallholder farmers in India. The genus is introduced to the country over a century ago, but it is showing an alarming expansion throughout rural India in recent decades. *Eucalyptus* is preferred over other species due to a number of merits that address the need of the farmers. Most farmers describe it is "life saviour", "safety net" or "tree bank" as it is converted easily and quickly to cash wherever needed. However, some public reactions against planting of *eucalyptus*. The criticisms are based on a range of technical, ecological and socio-economic arguments (Deml Teketay 2000). One of the ecological arguments is that, eucalypts threaten biodiversity and habitat quality by a phenomenon called allelopathy (El Darier 2002). Allelopathy can simply be understood as the ability of plants to inhibit or stimulate growth of other plants in the environment by exuding chemicals.

Many studies have evaluated the allelopathic effects of *Eucalyptus* species (Bajwa and Nazi 2005, Del Moral and Muller 1969, El-Khawas and Shehata 2005). Certain phenolic acids and volatile oils released from the leaves, bark and roots of certain *Eucalyptus* spp. act as allelopathic agents and are harmful to other plant species (Florentine and Fox 2003, Sasikumar *et. al.,* 2002). Chemically allelochemcial compounds have open chain molecular structures. These are secondary metabolites that have role in plant-plant, plant-soil, plant-disease, plant-insect and plant predator interactions that may be beneficial or detrimental to plant (Tang *et. al.,* 1989). The chemicals have harmful effects on the crop in the eco-system resulting in the reduction and delaying of germination, mortality of seedlings and reduction in growth and yield (Herro and Callaway 2003).

Urd (*Vigna mungo* L. Hepper) is one of the important pulse crops in agroforestry system because of its short duration, protein riched and nitrogen fixing character. The main characteristics of urd i.e reducing fertilizer needs, improving soil structure and providing plant protein are particularly important for developing countries where agricultural production is often limited due to the lack of supply of N fertilizer to the agricultural field.

MATERIALS AND METHODS

The experiment was conducted in the general laboratory having an average temperature range of 30-32 0C. The CAFRI is located at about 240 11' N latitude and 780 17' E longitude and an elevation of 271 meters above sea level (msl).

The experiment was conducted in the general laboratory having an average temperature range of 30-32 ^{0}C. The CAFRI is located at about 24^0 11' N latitude and 78^0 17' E longitude and an elevation of 271 meters above sea level (msl). Mean annual rainfall is 960 mm with an average of 52 rainy days per year. Mean maximum temperature ranges from 47.4 ^{0}C (June) to 23.5 ^{0}C (January) and mean minimum temperature from 27.2 ^{0}C (June) to 4.1 ^{0}C (December). The main soil types in

ISSN: 2319-880X

the region are red (Alfisol) and black (Vertisol).

Seeds of urd (*Vigna radiate* var. PU35, family: leguminaceae) were used. The seeds were thoroughly washed with distilled water and surface sterilized with mucuric chloride for 2 minutes and rinsed four times with distilled water.

The *Eucalyptus tereticornis* Clone3 water extract were prepared as follows. Fifty, hundred and one hundred fifty grams of air-dried *Eucalyptus tereticornis* clones 3 plant parts viz., leaf, twig and root powder were separately soaked in one litre of distilled water for about 24 hours at room temperature. The mixture were filtered through a double layer muslin cloth to obtain 5%, 10% and 15% concentrations of different plant parts. A complete randomised design was used for this experiment. This experiment was a laboratory bioassay. Four types of extracts from different parts of *E. tereticornis* clones were prepared. Twenty seeds of urd were arranged in 9 cm diameter Petri-dishes on two layers of filter papers under normal laboratory conditions. The experiment was replicated five times with completely randomised design.

For laboratory bioassay, the germination percentage recorded 7th day after sowing and plumule length and radicale length were recorded after 15 day. For measurement of the plumule and radicle length five representative germinated seeds were considered randomly from the twenty seeds in each Petri-dish.

The vigour index was calculated by using following formula given by Abdul Baki and Anderson, (1973).

Vigour index = Germination % X (Root length + Shoot length)

The dickson quality index was calculated by using following formula (Dickson *et. al.*,1960)

ISSN: 2319-880X

$$\text{Dickson Quality Index (DQI)} = \frac{\text{Total dry weight (gm)}}{\frac{\text{Plant height (cm)}}{\text{Collar diameter (mm)}} + \frac{\text{Shoot dry weight (gm)}}{\text{Root dry weight (gm)}}}$$

Data of germination and growth parameters were subjected to ANOVA using SYATAT statistical program. Comparison of the mean was performed using Least Significant Difference (LSD) with the control.

RESULT AND DISCUSSION

Germination (%)

The result presented in table 1, showed that germination efficiency of urd plants decreased significantly by the 15% leaf extract. Ten percent leaf extract had the next more pronounced negative impact on germination of urd, which is significantly higher as compared to 5% leaf extract.

Vigour index:

The vigour index was presented in table no. 2. The result revealed that maximum inhibition was recorded by the 15% leaf extract, which is significantly lower at 10%, and 5% leaf extract. Root extract showed less inhibition at 5% concentration. Control (0%) had higher vigour index as compared with plant parts and concentrations.

Shoot length (cm)

The shoot length of urd was highly suppressed by the 15% leaf extract. The maximum shoot length was recorded by 5% root extract. Control (0%) showed maximum shoot length (Table 3).

Root length (cm)

The root length of urd was significantly inhibited by 15% leaf extract. However, maximum root length was found in 5% twig extract. In plant parts, maximum inhibition was observed by leaf followed by root and twig (Table 4).

Shoot and Root Dry Weight (gm/5 seedlings)

Shoot dry weight of urd was significantly superior in 0% (control) (95.9 gm/5 seedlings). The 15% concentration (42.97 gm/5 seedlings) of leaf extract was recorded maximum inhibition effect followed by 10% (56.1 gm/5 seedlings) and 5% (64.0 gm/5 seedlings). The maximum root dry weight was observed in control (60.7 gm/5 seedlings). The significantly inhibition on root dry weight was observed by 15% concentration (18.2 gm/5 seedlings) followed by 10% (22.8 gm/5 seedlings) and 5% (27.3 gm/5 seedlings) (Fig.1). In

ISSN: 2319-880X

plant parts of *E. tereticornis* clones3, maximum suppression in shoot dry weight was found by leaf followed by twig and root. While, root dry weight was inhibited by leaf followed by root and twig (Fig. 2).

Dickson quality index (DQI)

In Dickson quality index maximum suppressing was recorded by leaf extract of 15% concentration followed by root extract and twig extract at 15% concentration. Significantly, higher DQI was observed in control (0%). It was observed that 10% of twig extract take maximum DQI followed by leaf and root extract (Fig. 3).

Eucalyptus monoculture plantations are reported to support either very little or almost negligible under-storey vegetation (Del Moral and Muller 1969, Singh *et. al.,* 1993). The species diversity index is also highly reduced under eucalypt monoculture plantations when compared with the other native plantations. Allelopathy has often been considered as a possible reason for the species depletion (Suresh and Rai 1987, Kohli *et. al.,* 1992). Venkatesh and Tripathi (2010) have reported significant reduction in the density, root and shoot length, biomass, and economic yield of forage crops under *E. tereticornis* clones. *Eucalyptus* are reported to release a number of volatile and non-volatile allelochemicals that affect growth of the associated vegetation (Kohli 1990). Various volatile terpenes like limonene, cineole, citronellal, citronellol, a-pinene, and grandinol, etc. identified from the crude oil are highly toxic and affect the germination and growth of native vegetation (Baker 1966, del Moral and Muller 1970, Kohli *et. al.,* 1992). A number of phenolic compounds viz., coffecic, coumaric, ferric, gallic, gentisic, hydroxybenyoic, syringic and vanillic acids and catechol in bark, fresh leaves, root and seed leachates of *Eucalyptus*spp. were identified in the soil and leaves of *Eucalyptus* (Kohli and Singh 1991). Similar inhibitory mechanism of Eucalyptus spp. on test crops were already reported by Suresh and Rai (1987) and Sasikumar *et. al.,* (2001). In addition, the leachates and extracts from the eucalypt leaves, litter, bark, flowers, and leaf mulch have been reported to reduce the germination and initial growth of a number of plant species (Singh and Bawa 1982, Sidhu and Hans 1988 and Kohli 1990).

CONCLUSION

This study was carried out to investigate the Phyto-toxicity of Eucalyptus tereticornis clones3 on germination and growth of urd (*Vigna mungo* L. Hepper). Germination and all the growth parameters of urd was reduced significantly under 15% leaf aqueous extract of clone3 of *Eucalyptus tereticornis*. Among the plant parts, the maximum toxicity was exhibited by leaf. Toxicity of the extract was in the order of leaves > twigs > roots and the concentration was in the order of 15% > 10% > 5% > 0%.

ISSN: 2319-880X

Table 1. Germination percentage in urd plants after 7 days of sowing affected by *E. tereticornis* clone3 extract.

Extract Source (P)	Extract Concentration (C)				
	0%	5%	10%	15%	Mean
Leaf	85	38	24	9	39
Twig	85	56	50	41	58
root	85	61	55	47	62
Mean	85	51.67	43.00	32.33	
	P	C	PxC		
$LSD_{0.05}$	1.77	2.05	3.55		

Table 2. Vigour Index of urd plants affected by *E. tereticornis* clone3 extract.

Extract Source (P)	Extract Concentration (C)				
	0%	5%	10%	15%	Mean
Leaf	2783	293	98	18	798
Twig	2783	1223	881	415	1325
root	2783	1406	1137	664	1498
Mean	2783	974	705.33	365.67	
	P	C	PxC		
$LSD_{0.05}$	51.87	59.90	103.74		

Table 3. Shoot length (cm) of urd plants affected by *E. tereticornis* clone3 extract.

Extract Source (P)	Extract Concentration (C)				
	0%	5%	10%	15%	Mean
Leaf	17.1	5.6	3.4	1.4	6.9
Twig	17.1	10.3	5.6	5.7	10.1
root	17.1	11.7	11.0	7.3	9.6
Mean	17.1	9.20	6.67	4.8	
	P	C	PxC		
$LSD_{0.05}$	0.39	0.45	0.78		

Table 4. Root length (cm) of urd plants affected by *E. tereticornis* clone3 extract.

Extract Source (P)	Extract Concentration (C)				
	0%	5%	10%	15%	Mean
Leaf	11.1	2.0	2.1	0.9	4.0
Twig	11.1	7.6	7.3	4.1	7.5
root	11.1	6.7	5.9	5.1	6.2
Mean	11.1	5.43	5.1	3.37	
	P	C	PxC		
$LSD_{0.05}$	0.20	0.24	0.41		

ISSN: 2319-880X

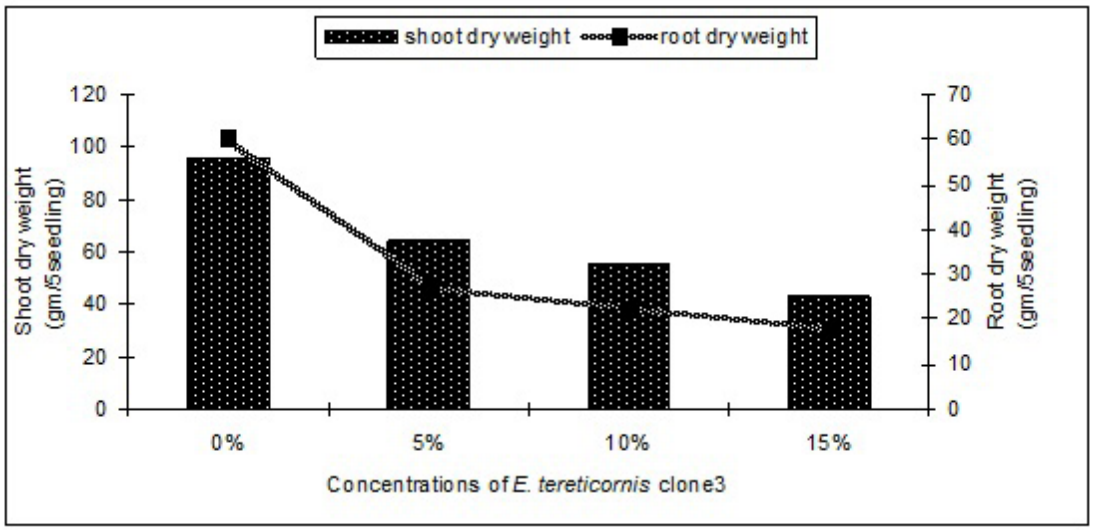

Fig. 1. Shoot dry weight and root dry weight of urd plants affecting by *E. tereticornis* clone3 different extract concentrations.

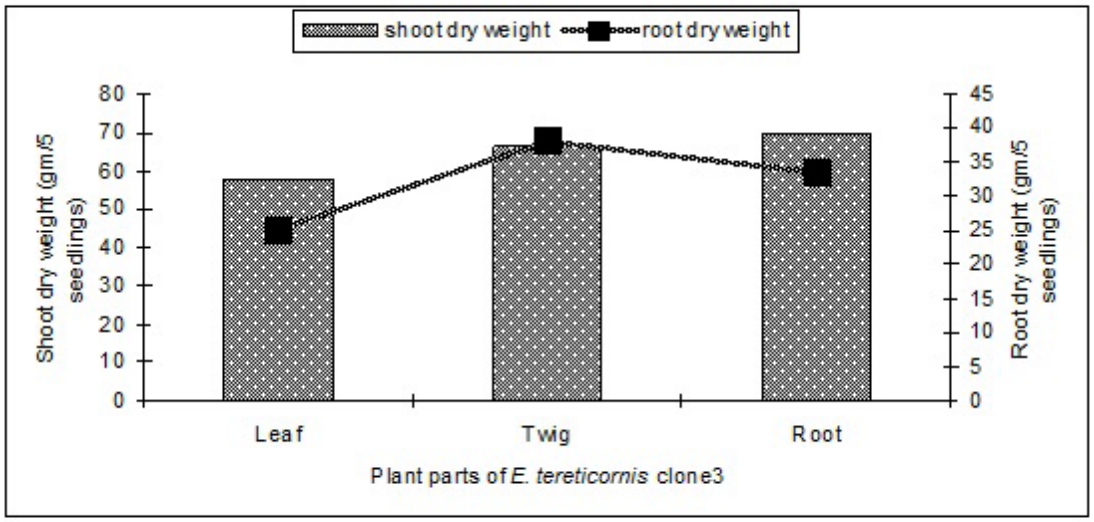

Fig. 2. Shoot dry weight and root dry weight of urd plants affecting by *E. tereticornis* clone3 plant parts extract.

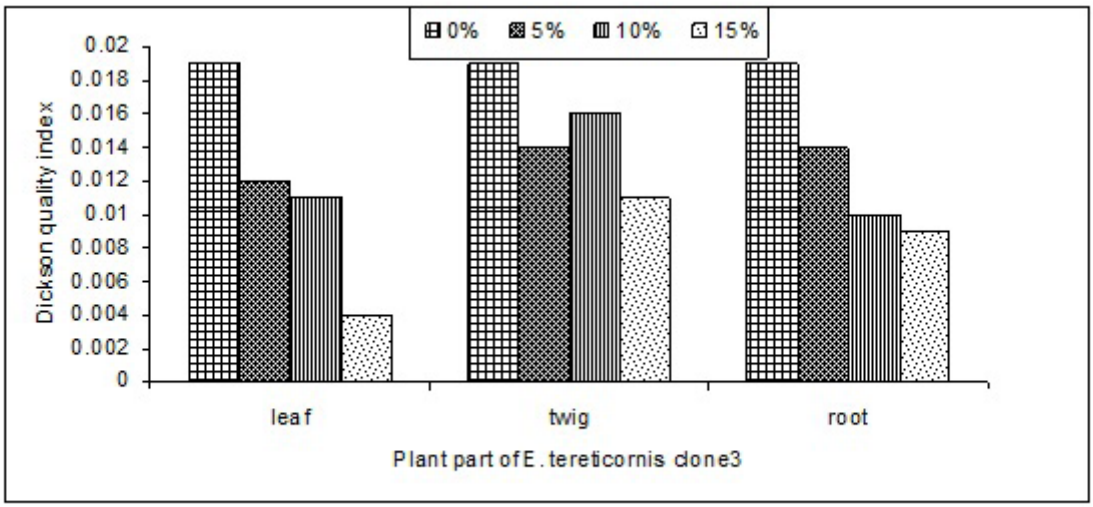

Fig. 3. Dickson Quality Index of urd plants affecting by *E. tereticornis* clone3 extract.

ISSN: 2319-880X

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ISSN: 2319-880X

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Int. J. Agri.Sci. & Tech. Vol. 3 (2) 2014, pp.11-16

ISSN: 2319-880X

USE OF MEDICINAL PLANTS FOR TREATMENT OF CANCER-A Review

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(Date of Receipt :27-08-2014 ; Date of Acceptance for Publication : 06-09-2014)

Abstract

Cancer is a major public health problem in both developed and developing countries. It was estimated that there were 10.9 million new cases, 6.7 million deaths, and 24.6 million persons living with cancer around the world in 2002. [15,16] And the number of cancer deaths are increasing, because most of the times the intervention is too late because patients put up with the symptoms instead of seeking treatment.[4]

Key Words: Cancer, Symptoms, Treatment, Cause of Cancer or The Molecular Basis of Cancer, Medicinal Plants And Traditional Medicine.

Pages: 6 **References: 25**

INTRODUCTION

Cancer is a fascinating biological problem and can be defined as a disease involving heritable defects in cellular control mechanism resulting in the formation of malignant and usually invasive tumors. A cancer arises from a single cell that undergoes a permanent change such that it goes on multiplying defying the architectural requirements of the tissue, the organ and the organism. The cancer cells morphologically and metabolically differs from normal cells of the body. Their source of energy is predominantly anaerobic. The tumor cells are primarily concerned with growth, not function. It acquires nitrogenous building blocks from the body stores to satisfy the continual demand for protein synthesis.

The cause of cancer or the molecular basis of cancer can be traced to, a non le-

ISSN: 2319-880X

thal damage to the chromosomes. Such genetic damage may be acquired by the action of environmental agents such as chemicals, radiations, viruses or it may be inherited in germ line[1]. Free radicals are molecules produced when the body breaks down food or by environmental exposures like smoke, radiation and tobacco. These free radicals can damage cells and play an important role in leading to heart disease, and cancer[2].

Antioxidants are the substance that protects the cells against the harmful effects of free radicals. They are present in foods and prevent the oxidation, a process which causes damage to the body. When the body uses oxygen, the by products which are produced are called free radicals which leads to cell damage. Antioxidants act as free radical scavengers and they prevent or repair the damage caused by the free radicals. Antioxidants are not produced by the body; they have to be taken through food. Plants are good source of antioxidants[3,5].

Hippocrates, father of modern medicine stated "Your food shall be your medicine and your medicine shall be your food." Concurrent nutritional deficiency plays a fundamental role in genesis of tumor and suggests that the disease process could be reversed by re-supplying the required nutrients in adequate amount.[6] Their holistic approach puts in place a balanced whole food diet, properly assessed mineral and vitamin supplementation and the usual herbal support for the organs of elimination, especially the liver, using plants such as dandelion root (*Taraxacum officianale* radix), milk thistle (*Carduus marianus*) and artichoke juice (*Cynara scolymus*). [7] Traditionally many plants and their parts have been used for the treatment of cancer or the symptoms arising due to it. Plants like - Vinca rosea, *Allium sativum* were frequently used as anti-inflammatory and anti tumor agents. Modern natural holistic approach to treat cancer has also accepted the importance of traditional knowledge. In Philippines "banaba" ("*Lagerstroemia speciosa*") and "tsaang gubat" ("*Carmona retusa*") has tested positive as potent anti cancer drugs[4]. In India 45000 species of plants are known , out of which 7000-7500 plants have been listed as plants of medicinal value. The ayurvedic system uses 700 plants, siddha system uses 600 and unani system uses 700 plants approximately, for medicinal purposes. Plants like *Abrus precatorius* (Ghungchi), *Acorus calamus* ,) *Ageratum conyzoides* L. (Asteraceae)., *Aglaia roxburgiana* (Priyangu), *Alnus japonica, Bauhinia variegeta ,Cassia fistula ,Catharanthus roseus* (*Vinca rosa*, Sadabahar),*Carduus marianus,Crocus sativus* (Saffron) , *Curcuma longa L,Cynara scolym,,Ervatania heyneana ,Hygrophila spinosa ,Hippocratea murcantha ,Indigofera mysorensis ,Ocimum sanctum* (Tulsi),*Olea polygama ,Phylanthus amarus ,Plumbago rosea , Podophyllum hexandrum , Semecarpus anacardium, Solenum dulcamara,Solenum indicum, Solenum khasianum, Solenum suratanse, Taraxacum officianale radix Terminalia arjuna, Terminalia chebula, Trigonella foenumgraecum, Venda parviflora, Wedelia calendulacea, Withania somniferra & Zingiber capitatum* are still used traditionally as herbal drugs against various types of tumors such as sarcoma, lymphoma, carcinoma and leukemia.[7,8 ,9, 17,19,20] Medicinal plants contains anti-oxidants eg:- vitamins (A,C, E, K), carotenoids, flavinoids (flavones, isoflavons , flavonones, anthocyanins, catechins, isocatechins), polyphenoles (ellagic acid , gallic acid,

ISSN: 2319-880X

tannins), saponins, enzymes and minerals (selenium, copper, manganese, zinc, chromium, iodine).[10] Several mechanisms have been proposed to explain the cancer-preventive effects of plants. These include inhibition of mutagenesis by inhibiting the metabolism, inhibition of DNA adduct formation, free-radical scavenging, and effects on cell proliferation and tumor growth. [24]

The interest in traditional medicine is not new, in 1925, Chatterji successfully used a copper margosate-ester in patients with head and neck cancer. Head and neck cancer constitutes a major problem in India. Hence, any potentially complementary therapy is worth exploring in these patients, where it could enhance the quality of their lives. [11] The wound-healing, antiinflammatory and antimutagenic activities of turmeric have been demonstrated convincingly.[12] Hastak *et. al.,* have shown its beneficial effect in oral submucous fibrosis - a precancerous condition [13]. In dimethyl benzanthracene (DMBA)-induced experimental breast cancer, curcumin has shown a significant reduction in carcinogenesis.[14] *Terminalia chebula* was active against leukemia cell lines. *Terminalia chebula, Acorus calamus, Bauhinia variegeta* and *Phylanthus amarus* were found to be effective against prostrate D U 145 cell lines[9] *Curcuma longa L.*(Zingiberaceae), which exhibit anti-inflammatory, anti-human immunodeficiency virus, anti-bacteria, antioxidant effects and nematocidal activities. Curcumin is a major component in *Curcuma longa L.*, being responsible for its biological actions. In vitro, curcumin exhibits anti-parasitic, antispasmodic, anti-inflammatory and gastrointestinal effects; and also inhibits carcinogenesis and cancer growth. [19] The stem bark of the Betulaceae plant Alnus japonica, which is indigenous to Korea, has been used as a popular folk medicine for hepatitis and cancer. [20]

With nature as a primary source and inspiration three basic strategies, are being followed for treatment of cancer. The first strategy in the traditional approach i.e. use of traditional system of treatment in which a holistic approach is followed. Natural cancer therapy focuses on eliminating the cancer cells but also focuses on stopping the process that initiated the cancer growth. Plants cleanse and revitalize our bodies from the inside. Use of traditional low fat, high fiber diet, rose oil, blackstrap molasses etc, is suggested with greater stress on fresh fruits vegetables and non refined products. [6].

The second strategy focuses on blending of the benefits of both the systems. In this line of treatment the main treatment is done using modern surgical processes along the use of chemotherapy etc but botanicals are given to counteract the harmful side effects of these powerful drugs. For example plant Tinospora cordifolia Hook (Guduchi) was used as a standardized formulation before and after cancer chemotherapy to reduce the incidence of nausea, vomiting and granulocytopenia. [18].The therapy commonly called as phytotherapy uses simple cost-effective measures that can provide greater patient comfort, more effective treatment of the patient within the hospital and, it is hoped, a longer, more fulfilling survival period.[7] But the third strategy which involves identification, isolation and characterization of various bioactive compounds present in medicinal plants. [2, 19, 20,] is the most favoured one. The stress is on clinically us-

ISSN: 2319-880X

ing secondary metabolites and their derivatives to combat cancer. (21)

Currently, over 50% of drugs used in clinical trials for anticancer activity were isolated from natural sources or are related to them. (22) A number of active compounds have been shown to possess anticancer activity; these include flavonoids, diterpenoids, triterpenoids, and alkaloids. (23). The bioactive compound responsible for antiradical activity of *A. conyzoides* is 3, 5, 7, 4'-tetrahydroxyflavone (kaempferol)., (25) Curcumin in *Curcuma longa* L.(Zingiberaceae)(19).

Now it is clear that the diseases, caused by free radicals, could be managed by enhancing anti-oxidant defense systems. The discovery of new enzymes inhibitors and antioxidant compounds from medicinal plants would surely help overcome the cancer agents. As preparation of standardize dose & dosage regime which are very crucial for the treatment will become easier after isolation of the compund. This wills enable us to produce the bioactive compound or its chemical derivatives en masse. So the future of cancer treatment lies in the hands of reverse pharmaceuticals that identify the natural compounds in plants and synthesize their chemical derivatives.

ACKNOWLEDGEMENT

The authors are grateful to the authors / editors of all those articles, journals and books from where the matter for this has been reviewed and discussed.

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Int. J. Agri.Sci. & Tech. Vol. 3 (2) 2014, pp. 17-21

ISSN: 2319-880X

EFFECT OF DAIRY EFFLUENTS ON EARLY SEEDLING GROWTH OF *Pennisetum typhoides* (L)

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Abstract

Ŵith the growing industrialization and urbanization environment degradation has now become challenging global problem. Among the industries food processing industrial effluents released from the dairy industries are rich in various kinds of nutrients like phosphate, Calcium, Nitrogen, Magnesium etc. and has good potential in utilization of released effluents as source of nutrients for the crop plants. To study the effect of dairy effluents on early seedling growth of Pennisetum typhoides (L). different parameters like i) Plumule and redicle ratio, ii) Fresh wt. and dry wt of germinated seeds, iii) Height of the stem, iv) Fresh wt. and dry wt. of stem, v) Root length, vi) no of leaves, vii) internodal length etc, of plants under various concentrations of milk plant effluent in compost rich and compost free soil are taken. The vegetative growth of pearl millet increases with the increase in concentration of effluent upto 80 percent decreases when irrigated with 100. conc. of effluent,

Key Words: Pearl Millet, Seedling Vegetative Growth, Dairy Effluent.

Pages: 05 **References: 11**

INTRODUCTION

Pearl millet, *Pennisetum typhoides* (L) is the basic staple for households in the poorest countries and among poorest people because of having high protein and high fat content Chemical fertilizer and industrialisation cause great hazards to the crop field, but dairy effluents released from milk plant due to presence of varied groups of chemical compounds including nutrients like phosphate, magnesium, calcium etc. help in soil fertility and would also increase productivity of the land. The study related to effect of dairy effluents on early seedling growth of *Pennisetum typhoides*(L) is of great emphasis.

ISSN: 2319-880X

MATERIAL AND METHODS

For studying physico-chemical analysis of soil collected from Balsamand area, Hisar air dried soil samples passing through 2.0 mm sieve were used, ph, electriacal conductivity, calcium carbonate, organic carbon, nitrogen, phosphorous, potassium estimation are done and for physico-chemical analysis of dairy effluents released from milk plant, sirsa, Haryana, Ph, electrical conductivity, total dissolved solids, calcium, magnesium, sulphate, phosphate, chloride, BOD, COD are done. To carry out the effect dairy effluents on early seedling growth first twenty seeds sterilized in $HgCl_2$ for 2 minutes were soaked in water in a beaker for 8 hours. Total thirty six earthen pots (18 for compost soil and 18 for without compost each filled with 2.0 kg soil numbering with 1, 2, 3 .....35,36 in each pot numbered 1-15, 100 gms vermicompost was also mixed thoroughly, then these pots were irrigated with different doses of effluent i, e control 20% , 40% , 60%, 80%, and 100% regularly up to 60 days. then different parameters of early seedling growth were observed and recorded minutely.

RESULTS AND DISCUSSION

Table 1 :

The height of stem (cm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent.

Concentrations	Height of Stem (cm)							
	Compost				Without Compost			
	15th	30th	45th	60th	15th	30th	45th	60th
	Day				Day			
Control	4.3	6.2	11.3	40.4	3.4	5.7	9.8	28.5
20%	4.3	5.8	11.8	42.2	3.1	6	10.6	39
40%	4.5	6.3	12.5	45.4	3.5	6.6	11.4	43.8
60%	4.6	6.3	13.1	47.4	4.0	7.0	12.2	47.2
80%	5.2	6.5	13.5	59	4.3	8.8	12.5	52
100%	3.1	4.9	10.7	38.5	3	5.5	8.8	26.7

The stem height of pearl millet was observed to be maximum at 80 % concentration of effluent under both compost (59cm) and without compost (52cm) after 60 days of sowing.

Table 2

The fresh weight and dry weight of stem (gm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent.

Concentrations	Stem			
	With Compost		Without Compost	
	Fresh Wt. (gm)	Dry Wt. (gm)	Fresh Wt. (gm)	Dry Wt. (gm)
Control	31	5	12	2.2
20%	36.2	4.2	18.6	2.7
40%	41.6	5	19	2.7
60%	51.6	5.3	21.1	2.9
80%	54	6.8	22.5	3.6
100%	30	4	11.5	2.0

The fresh wt. and dry wt. stem of pearl millet were observed to be maximum at 80% concentration of effluent under both compost (fresh wt =54 gm, dry wt. = 6.8 gm) and without compost (fresh wt = 22.5 gm, dry wt. = 3.6 gm) and were observed to be minimum at 100% conc. of effluent under both compost (fresh wt = 3. gm, dry wt. 4gm) and without compost (fresh wt 11.5 gm, dry wt. = 2.0 gm)

Table 3 :

The root length (cm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent, after 60 days of sowing.

The root length was observed to be maximum at 80% concentration of effluent under both with compost (root length 42.4

ISSN: 2319-880X

Concentrations	Root length (cm)	
	Compost	Without Compost
Control	36.8	37.8
20%	38.2	38
40%	40	38.5
60%	41.2	39.2
80%	42.4	40.1
100%	39.6	36.9

cm) and without compost (root length =40.1 cm) and, minimum at control (36.8 cm) under with compost where as in case of without compost the minimum root length (36.9 am) was observed at 100% con of effluent.

Table 4:

The fresh weight and dry weight of root (gm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent, after 60 days of sowing.

Concentrations	Root			
	With Compost		Without Compost	
	Fresh Wt. (gm)	Dry Wt. (gm)	Fresh Wt. (gm)	Dry Wt. (gm)
Control	2.2	1.09	1.06	0.57
20%	2.74	1.15	1.11	0.59
40%	3.21	1.17	1.56	0.64
60%	3.7	1.23	1.72	0.8
80%	5.80	1.66	1.80	0.88
100%	2.20	1.03	0.95	0.55

Fresh wt. and dry wt. root were observed to be maximum at 80 percent con. of effluent both compost (fresh = 5.80gm, dry wt. = 1.66 gm) and without compost (fresh wt. = 1.80 gm. dry wt. =.88), minimum at 100 percent conc. of effluent under both with compost (fresh wt = 2.20 gm. dry wt. = 1.03 gm), without compost (fresh wt = .95 gm, dry wt. = .55 gm).

Table 5:

The number of leaves, under compost and without compost, of pearl millet as influenced by different concentrations of effluent.

Concentrations	No. of leaves							
	Compost				Without Compost			
	15th	30th	45th	60th	15th	30th	45th	60th
	Day				Day			
Control	4	4	6	8	3	4	5	7
20%	3	4	6	9	3	4	6	8
40%	4	4	7	9	3	4	6	8
60%	4	4	7	10	3	3	6	8
80%	3	4	7	11	3	4	7	9
100%	3	4	6	7	3	4	5	6

Number of leaves was observed to be maximum at 80 percent conc. of effluent under both with compost (11) and without compost (9), minimum at 100 percent conc. of effluent under both with compost (7), without compost (6).

Table 6 :

The collar diameter of stem (cm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent.

Concentrations	Collar Diameter (cm)							
	Compost				Without Compost			
	15th	30th	45th	60th	15th	30th	45th	60th
	Day				Day			
Control	1.06	1.60	2.3	4	1.02	1.36	1.77	2.84
20%	1.10	1.61	2.76	3.92	0.84	1.34	1.9	2.6
40%	1.13	1.63	2.75	3.84	0.86	1.38	1.96	2.70
60%	1.2	1.60	2.74	3.77	0.8	1.38	1.95	2.58
80%	0.93	1.34	2.70	3.70	0.88	1.4	2	2.51
100%	0.95	1.33	2.65	3	0.97	1.43	1.6	2.36

Collar diameter of stem observed to be maximum at control treatment under both with compost (4cm) and without compost (2.84 cm) after 60days of sow-

ISSN: 2319-880X

ing, minimum at 100% conc. of effluent both with compost (3.0cm) without compost (2.36cm) after 60 days of sowing.

7.(a)

Internodal lengths (cm) of pearl millet as influenced by different concentrations of effluent, after 60 days of sowing **(compost) .**

Concentration	Internodal length (cm) (Compost)									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Control	4.34	6.5	9.34	8.67	8.2	6.9	6.2	4.2		
20%	1.93	4.3	5.40	6.65	5.86	4.58	2.53	0.8	2.2	
40%	3.63	8.53	9.6	9.25	8.84	7.92	6.06	2.32	1.8	
60%	1.97	6.46	7.70	7.65	7.59	6.44	5.04	4.2	0.5	
80%	4.07	8.66	10.28	10.45	9.10	8.16	7.38	4.06	2.4	1.8
100%	5.20	8.24	8.16	8.04	8.17	6.70	5.2	4.2		

7.(b)

Internodal lengths (cm) of pearl millet as influenced by different concentrations of effluent, after 60 days of sowing **(without compost).**

Concentration	Internodal length (cm) (Without Compost)									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Control	2.36	3.28	4.06	4.2	4.54	3.2	5.94			
20%	1.5	6.12	7.04	7.18	7.39	6.4	4.09	5.34	2.6	
40%	3.82	6.14	8.3	8.16	5.05	4.2	5.72	3.6	2.3	
60%	5.44	6.86	7.16	8.14	9.35	8.36	8.16	7.1		
80%	3.96	7.95	8.72	10.44	9.59	6.8	6.34	2.2	8.2	
100%	1.66	3.90	4.14	6.69	4.99	2.75	2.2			

In case of compost, the minimum internodal length was recorded 20 percent conc. of effluent and in case of without compost minimum internodal length was recorded with control treatment where as maximum at 80% conc. of effluent under both compost and without compost.

CONCLUSION

Pearl millet crop irrigated with 100 percent concentration of effluent i, e effluent without dilution causes decrease in vegetative growth in comparison to control condition due to presence of sulphate and phosphate in the effluent. Vegetative growth increases with the increase in concentration of effluent upto 80 percent.

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Int. J. Agri. Sci. & Tech. Vol. 3 (2) 2014, pp. 22-25

ISSN: 2319-880X

STUDY THE EFFECT OF DAIRY EFFLUENTS ON SEED GERMINATION OF HIGH NUTRIENT QUALITY PEARL MILLET-*Pennisetum typhoides*(L.)

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(Date of Receipt :26-08-2014 ; Date of Acceptance for Publication : 23-09-2014)

Abstract

Ťoday environmental degradation has become a global phenomenon due to industrialization and urbanisation. Most of the effluents contain varied groups of chemical compound including nutrients. This nutrient helps in fertilization of soil and would also increase productivity of the land. The present study deals with the effect of dairy effluent on seed germination of the crop high nutrient pearl millet *Penniselum typhoides*(L) : The main objective of this study is the effect of dairy effluents on seed germination. Percentage of pearl millet in various. concentrations of effluent (20%, 40%, 60%, 80%, 100% and control in laboratory in Petridis. The germination percentage of pearl millet decreased as the concentration of effluent increased.

Key words :- Pearl Millet, Dairy Effluent, Germination.

Pages: 4 **References: 9**

INTRODUCTION

Environmental degradation has now become a global problem and maintaining ecosystem health is a serious issue by environmentalists. Due to lack of effluent treatment facilities and proper disposal system of waste, water bodies are getting polluted day by day and causing adverse effect on soil, water, agriculture, flora and fauna due to presence of toxic and persistent chemicals. So it become essential either to find suitable ways for the safe disposals of these wastes or to suggest their novel use by their by-product. Finding a profitable use for this waste could further benefit the economics of industry. Among these industries food processing industrial effluents relapsed from the dairy industry Milk Plant, Sirsa. Haryana is rich in phosphate, calcium and magnesium etc. and has good potential in utilization of released effluents as a source of nutrients for the crop plants like Pennisetum typhoides (Pearl millet). Pearl millet is a high nutrient quality having high amount of protein fat, a basic staple for households in the poorest countries and among poorest people. For this, studies related of seed germination were carried out to check the viability of seeds. In my

ISSN: 2319-880X

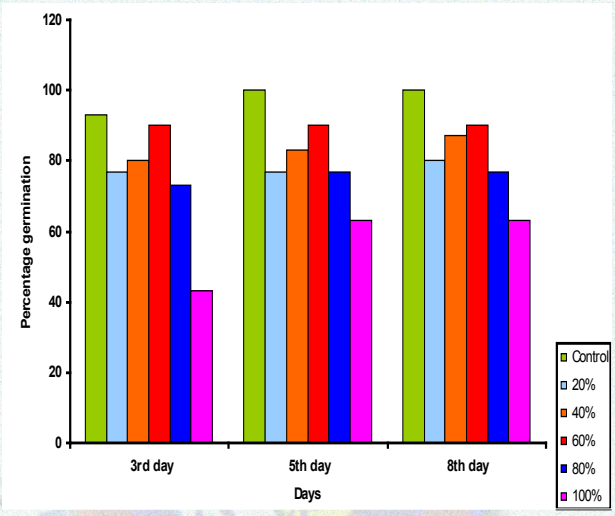
present work I have investigated the germination percentage of seed pearl millet seed along with radicle and plumule lengths and also the fresh weight and dry weight of germinated seedlings.

MATERIAL AND METHODS

To carry out the study for physico chemical analysis of soil collected from Balsamand area, Hisar air dried soil samples passing through 2 mm sieve were used, ph, electrical conductivity, calcium carbonate, organic carbon, nitrogen, phosphorous, potassium are done and for physico chemical analysis of dairy effluents ph, electrical conductivity, total dissolved solids, calcium, Magnesium, sulphate, phosphate, chloride, BOD, COD are estimated. To carry out the effect of dairy effluent seed germination experiments first to check the viability of seeds. For this twenty seeds of pearl millet were soaked in water taken in a beaker for 30 minutes. After that these seeds were placed on double layered water soaked filter paper placed in petri plates. The covered petriplates were kept in BOD at 25+ l°c for 3 days. After 3 days, first observation was done for their viability; secondly to study the effect the effect of various concentrations of effluents (20%, 40%, 60%, 80%, 100% and control) of milk plant on seed germination percentage, first all seeds of pearl millet sterilized in $HgCl_2$ for 2 minutes. Eighteen petriplates (for six setups in multiple of three) were used. At one time ten seeds were taken on double folds of whattman no. 1 filter paper for every petriplate and were supplied with different dose of effluents in controlled condition at 25+l°c in seed germination for the experimental period 1–8 days Reading were taken after. 3rd day, 5th day and 8th day. On 8th day radical and plumule lengths were noted and radical / plumule ratio was derived; dry and fresh wt of germinated seedlings were estimated.

RESULTS AND DISCUSSION

Bar 1.
RESULTS OF SEED GERMINATION EXPERIMENT



The germination percentage of pearl millet decreased as the concentration of effluent increased (Fig.: 4.3.1).The maximum germination percentage i.e. 100 per cent was observed under control and minimum i.e. 63.3 per cent was observed under 100 per cent concentration of effluent on 8th day of germination. The percentage of seed germination increased up to 60 per cent concentration of effluent. The percentage of seed germination at 20 per cent concentration of effluent was found to be 80 per cent and at 60 per cent concentration it was found to be 90 per cent. The similar observations were recorded by (Gautam *et. al.,* 1992; Arora *et. al.,* 2005; Ajmal *et. al.,* 1984). The viability of the seeds was recorded to be 100 percent.

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Table 1.

Effect of different concentrations of dairy/ milk plant effluent on the plumule length and radical length(cm) of germinated seedlings of pearl millet after 8 days.

Concentration	Length of Plumule (cm)	Length of Radicle (cm)	Plumule : Radicle Ratio
Control	5.2	16.2	0.32
20%	5.3	16.4	0.32
40%	6	17.3	0.35
60%	6.5	18.3	0.35
80%	3.4	12.5	0.27
100%	1.3	4.9	0.26

Plumule radicle ratio was recorded maximum i.e. 0.35 at 40 percent & 60 percent conc. of effluent and minimum i.e. .26 at 100 percent effluent.

Table 2:

Effect of different concentrations of dairy/ milk plant effluent on the fresh weight and dry weight(gm) of germinated seedlings of pearl millet after 8 days.

Concentrations	Fresh wt. of germinated seedlings (gm)	Dry wt. of germinated seedlings (gm)
Control	1.291	0.109
20%	1.319	0.119
40%	1.411	0.127
60%	1.450	0.138
80%	0.954	0.089
100%	0.540	0.047

The fresh wt. and dry wt. of germinated seedling of pearl millet were observed to be minimum i.e. 0.540 gm and .047 gm respectively at 100 percent concentration; and to be maximum i.e. 1.450 gm and 0.138 gm respectively at 60 percent conc. of effluent.

CONCLUSION

It is concluded that germination percentage of pearl millet decreased as the concentration of effluent increased i.e.

i) 100 percent germination was observed under control and minimum under 100 percent concentration of effluent.

ii) Plumule radicle ratio was recorded maximum at 40 percent and 60 percent and minimum at 100 percent concentration of effluents.

iii) Fresh wt. and dry wt. of germinated seeding of pearl millet also increased as the conc. of effluent increased upto 60 percent and decreased upto 100 percent conc. of effluent.

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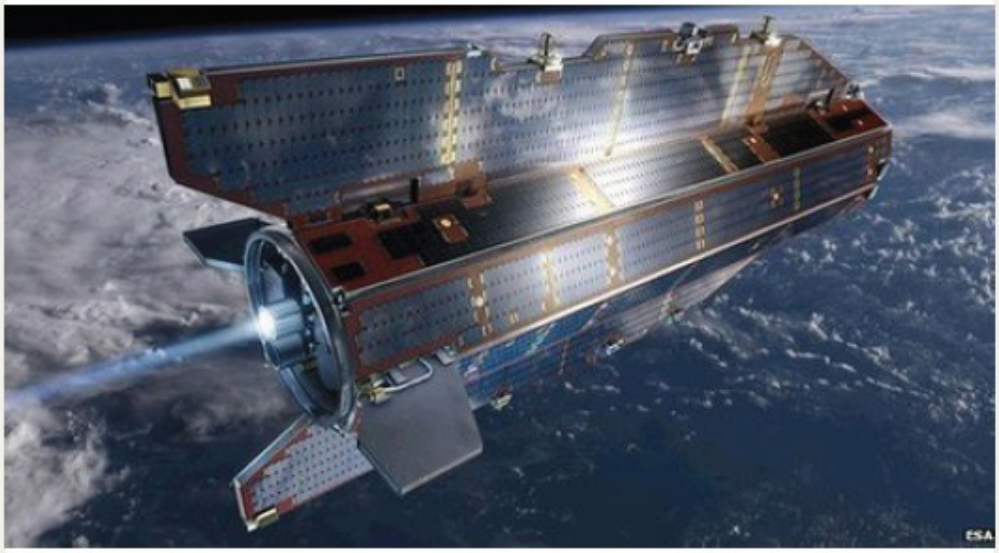

Goce needed its engine power to stay in orbit

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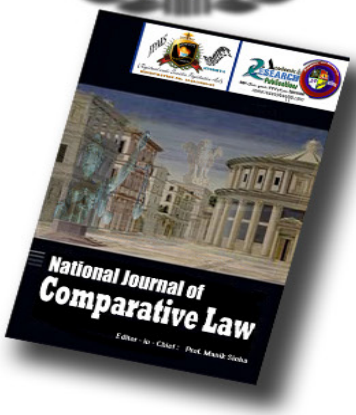

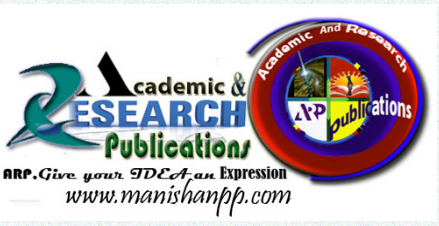

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